

Dissertation Title	Genetic Diversity and Biology of <i>Sirindhornia</i> H. Æ. Pedersen & Suksathan (ORCHIDACEAE)
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ABSTRACT

The natural populations of *Sirindhornia* species were studied on their biology and genetic variation during 2006-2008 in Thailand. It was found that each species are self-compatible and depend on insects for the pollination. *Sirindhornia mirabilis* exhibited prolonged longevity of individual flowers and produced more flowers per inflorescence features that may have evolved in response to low visitation rates. In all three species, the female (and in *S. mirabilis* also the male) reproductive success decreased from the basal to the apical part of the inflorescence with differential fruit set in rewarding orchid species. Comparison of demographic and reproductive characteristics between the local endemics *S. mirabilis* and *S. pulchella* and the widespread *S. monophylla* found that the three species had similar demographic characteristics, but different reproductive attributes. The local endemics were more reproductively restricted than the widespread *S. monophylla*. Thus, the latter exhibited higher relative fruit set, higher seed production per inflorescence and more equal individual contributions of progeny. However, recruitment appeared to be more efficient in *S. pulchella* than the other two species. The observation of pollination biology in *S. mirabilis* was shown that the small carpenter bee in the genus *Ceratina* (Apidae, Xylocopinae) was very important pollinator, but visited infrequency. In

the roots of all species of *Sirindhornia* found most of Rhizoctonia-like fungi. Seed germination *in situ* of *S. mirabilis* could develop into seedling stage with very low number, whereas, seeds of *S. monophylla* could germinate into protocorms stage, but no further development. Only mature seeds of *S. monophylla* germinated after 16 month of incubation *in vitro*, while, only immature seeds (5 weeks after pollination) of *S. mirabilis* germinated. Thus, seed germination requires different factors for each species. The study of genetic variation of the genus *Sirindhornia* revealed that they have moderate genetic diversity ranged from 0.11-0.15, a little lower than other allogamous orchid species, due to sharing male gamete from the same plant. They also have rather similar genetic diversity between populations, which can be explained by high gene flow (pollen-mediated and seed mediated) or by the history of populations, such as recent colonization or continue connection between population in the past as a large population. Finally, it was found that *S. monophylla*, wider distribution has genetic diversity higher than *S. mirabilis* and *S. pulchella*, endemic species. For conservation point of view, natural populations, individuals and seeds need to be conserved in order to keep genetic resource of these vulnerable species. Cross hand pollination may help to increase genetic variation in population, but it needs to be confirmed by further study.

Keywords: *Sirindhornia* / Orchidaceae / Genetic diversity / Biology